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UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

Project	Date	Author

TITLE

A PHOTOGRAPHIC STUDY OF RISK TREES

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By
Charles B. Eaton
Berkeley, California
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Berkeley, California
June 25, 1941

A PHOTOGRAPHIC STUDY OF RISK TREES

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A PHOTOGRAPHIC STUDY OF RISK TREES

INTRODUCTION

One of the major activities of the Forest Insect Laboratory at Berkeley in recent years has been the development of a system for classifying ponderosa and Jeffrey pine trees in forest stands of northeastern California according to their susceptibility to insect attack. A description of the system was originally prepared in an office report by Salman (1938), and the term "risk ratings" was applied to the four classes used to segregate the trees. The rating of risk is based on the ocular appraisal of crown characters which according to Salman and Bongberg (1941) "often appear as symptoms of progressive but incomplete infestations in portions of trees, poor health, decadence, or pathological conditions."

JUSTIFICATION

Thus far no methods have been perfected for quantitatively measuring in situ crown characters (needle length, color and complement, percent of dying twigs, etc.) used in rating risk. It has therefore been impossible to describe the four risk classes in other than general, comparative terms. The need for better definition of the classes has become apparent where intensive studies have been undertaken to follow changes in the risk of individual trees, and where tests have been made to determine the consistency of different men in applying the ratings. Thus the present study is justified by the following tenets:

1. Photographs can be made to show crown conditions that the observer visually appraises in applying risk ratings.

2. Improvement in the ease and consistency of applying risk ratings can be expected by supplementing the present written descriptions with illustrations.

3. Ways in which at least some of the crown characters change over a period of years can be shown photographically.

SCOPE

The study was proposed in the fall of 1940 with the major objective of establishing a series of trees in the different risk classes, photographs of which could be taken in both color and black and white at periodic intervals to show changes in risk characters. Secondarily the

study is intended to provide pictures of different types of risk trees to be used both in preparing reports and in presenting illustrated discussions of the risk system.

This study has been set up as a special phase of the entomological program being conducted by the Bureau of Entomology and Plant Quarantine in cooperation with the California Forest and Range Experiment Station on the Black's Mountain Experimental Forest.

METHODS

Selection of Trees

Utilizing the risk plots already established by J. W. Bongberg and assistants on the five compartments of the Experimental Forest to be left as natural areas, 48 trees were selected as suitable for photographing. The choice of trees was governed by the following factors:

1. Background
2. Lighting
3. Tree class

In general trees were selected that could be photographed against the sky without interference from other trees, although it was not possible to obtain this condition in all cases. The black and white pictures were taken in diffuse light against cloudy skies. The color pictures were taken in bright sunlight under flat lighting conditions. An attempt was made to secure a distribution of trees in the four risk classes, and to include in the series the most common representatives of Dunning's and Keen's classes.

Establishment of Photographic Stations

On the risk plots, photographic stations have been established from which each tree can be subsequently rephotographed. These stations are marked on the ground with 2" x 2" cedar hubs, the tops of which are set to within 6" or 8" of the ground level. The hubs are painted black and white, and are thus distinguishable from the plot subdividion stakes which are solid white. There is a metal tag nailed to the top of each hub bearing the number of the tree for which the station was established. Practically all the trees were previously numbered with "Paintcil" by Bongberg when the risk plots were laid out; however, a few trees were included in the series which are outside the plot boundaries and these trees are numbered with lumber crayon. The hubs are referenced to three points in each case, and appropriate notes containing the reference data are on file. Thus any station that may be destroyed accidentally can be reestablished. The hub and tree locations are plotted on the maps appended to this report.

Photographic Equipment

Since both black and white, and color photographs were desired, two cameras were used. The black and white pictures were taken on 9 x 12 cm. Panatomic-X film (pack), using an Eastman Recomar camera belonging to the writer, and equipped with an f. 4.5 Kodak Anastigmatic lens with a focal length of 135 mm. The color transparencies were taken with a Rolleicord camera belonging to J. M. Miller, and fitted with an adapter to accommodate 38 mm. Kodachrome film. This camera was equipped with an f. 3.8 lens having a focal length of 75 mm. Pictures on both types of film were taken from the same station, the difference in the focal length of the lenses taking care for the most part of the difference in picture size. Emphasis was laid on getting most of the crown of the tree in each picture, rather than attempting to include the entire trunk. All pictures were taken with the camera mounted on a tripod. Exposure and stop were derived by the use of a Weston photoelectric exposure meter. For the black and white shots small lens openings were employed, whereas for the color shots the larger lens openings were used.

Records and Files

The notes relating to the location of the photographic hubs, and the data for each picture were recorded on the standard "Photograph Record" form, a sample copy of which is attached. A duplicate series of these records has been prepared so that one set will be available for field use while the other may be left on file. A separate form bearing a summary of the various classes for each tree has been drawn up for use with the Kodachrome transparencies. It will be noted that space is provided on both these forms for the addition of information on repeat pictures.

The negatives for this series of pictures have been deposited in the Photographic File of the Berkeley Station (Numbers 11400 to 11447 inclusive). A separate negative number has been assigned for each tree, with an alphabetical subdesignation to denote the year the picture was taken, i.e., 11400A is the negative number for the picture taken in 1940 of tree number 23, Risk Plot A21-10. The next picture of this tree should be designated 11400B, etc. The color transparencies have been placed in a separate file and identified by the Block designation (i.e., of the Experimental Forest), tree number, and year Thus the slide marked P-230 '40 is a picture taken in 1940 of tree number 230, located on the risk plot in Block P of the Experimental Forest.

RESULTS AND DISCUSSION

As indicated in the foregoing paragraphs this season's work has been mainly a matter of setting up the study, taking the first set of pictures, and organizing records and files. Obviously, nothing can yet be said regarding the success with which photographic methods can be used to depict change in risk, since only one set of pictures has been made. The study does, however, show some results in the way of illustrating several different types of risk trees. Some of these types are shown in Plates I to IV in which there have been assembled paired photographs of different trees, similar in crown form but differing in risk class. It should be emphasized here that these are but a few of a number of different types of crowns in which the same contrast may be shown pictorially.

In Plate V there is shown what can be done with line drawings to illustrate gradations in crown deterioration in ponderosa pine./ In preparing this plate a special technique was used involving the bleaching of inked drawings made over photographs. The original pictures were enlarged on single weight Defender Illustro paper having a semi-glossy surface. Light prints were made in each case, and the image of the tree then traced over with india ink. The prints were bleached with a solution made of thiocarbamide (240 grains), nitric acid (4 drams), and water (20 ounces); - a process which leaves the inked image against a white background. After being rinsed for a few minutes in water the pictures were dried, pressed, and assembled in the form of a plate. It should be emphasized here that this plate is not intended to show the most common or characteristic types of the four classes of risk; it is intended to show four degrees of risk for one crown form of ponderosa pine, and to illustrate what could be done in depicting risk trees by line drawings.

FUTURE WORK

It is planned that the trees already selected in this study shall be rephotographed in black and white annually, and that the color transparencies shall be taken every two years. The length of time during which it will be necessary to continue the retakes will depend on the results secured. In regard to the black and white pictures some experimentation is needed to determine what conditions of light and sky background are best suited to bring out crown conditions most vividly, in view of the fact that the procedure followed this year in taking photographs in diffuse light against light skies was not entirely satisfactory. It is recommended that cut film rather than film pack be used for future pictures, and that consideration be given to using orthochromatic rather than panchromatic film.

In view of the emphasis currently being placed on risk trees in both research and control studies in the ponderosa pine region, it appears to the writer that there is a definite need for a pictorial definition of risk. This need could be filled by the preparation of a brief or manual

incorporating the present definitions of risk trees and risk characters with specific illustrations. It would be possible, for example, to illustrate the gradations in crown deterioration for each of the common types of crowns designated in Dunning's Tree Classification. It is suggested that the present study be expanded to provide for the preparation of such a manual.

REFERENCES

Salman, K. A. 1938. Descriptions of risk ratings for ponderosa and Jeffrey pine in eastside forest areas of California. Forest Insect Laboratory, Berkeley, California. (MS)

Salman, K. A., and J. W. Bongberg. 1941. Logging high risk trees to control forest insects in pine stands of northeastern California. Forest Insect Laboratory, Berkeley, California. (MS in preparation for publication)

Sample Forms

PHOTOGRAPH RECORD

PHOTO NO. 11400 / A-23 PLOT NO. A21-10 DATE 9-4-40 / 9-20-40

Black's Mt. FOREST T.____ R.____ S.____; ____M

LOCATION OF BASE POINT 148 links S30°E from tree No. 23, 66 links from tree No. 40, 51 links from tree No. 36

HT. OF CAMERA 45" DIRECTION OF LENS N30°W

TIME OF DAY 11:10 A.M. / 8:45 A.M. SKY COND. Partly cloudy / Clear

FOCAL LENGTH 135 mm. / 75 mm. STOP f.18 / f 5.6 EXPOSURE 1/25 sec. / 1/50

FILTER K-2 Wratten SUBJECT Tree No. 23, Risk 3

OBJECT OF SERIES Illustrate different types of risk and follow changes in risk.

FILM: Panatomic X / Kodachrome

REPEAT PHOTOGRAPHS

NUMBER	DATE	PHOTOGRAPHER	REMARKS

KODACHROME NO. A-23

PHOTOGRAPHIC STUDY OF CHANGE IN RISK

PLACE: B.M.E.F. PLOT: A21-10 TREE NO: 23

YEAR	PHOTO BY	RISK	DUNNING	KEEN	OBSERVER
1940	CBE	3	5	4C	JWB

FORM B-71

PLATE I

High Risk

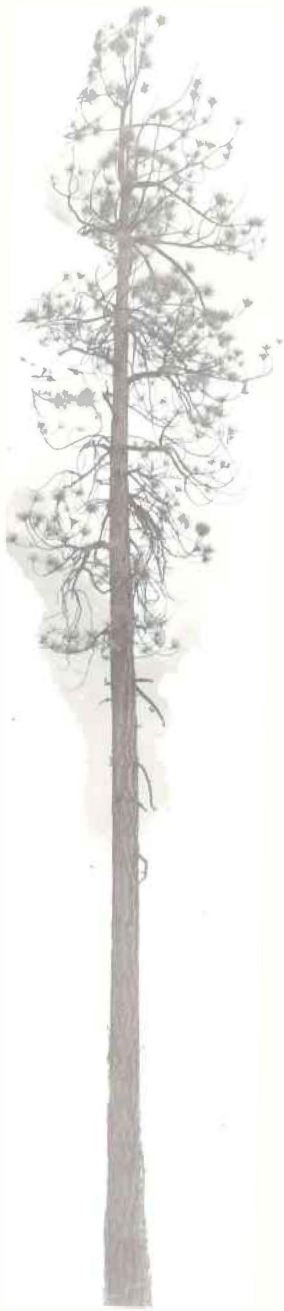
Low Risk

PLATE II

High Risk

Low Risk

PLATE III

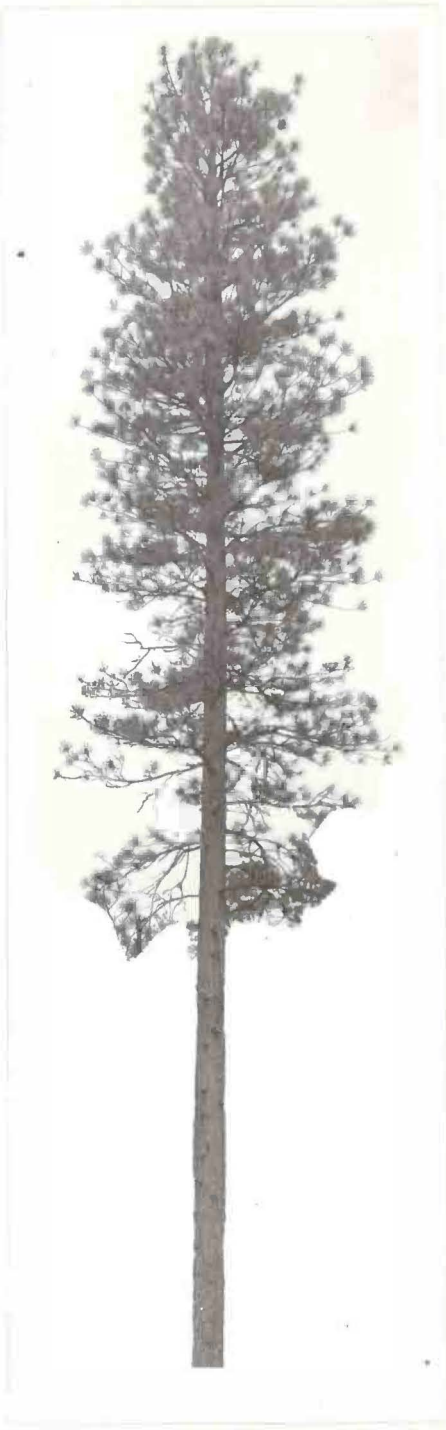


High Risk

Low Risk

PLATE IV

High Risk



Low Risk

PLATE V

RISK CLASSES FOR PONDEROSA PINE

Low Risk

High Risk

TREE LOCATION MAP

RISK PLOT B.M.E.F.

COMPARTMENT A 21-10

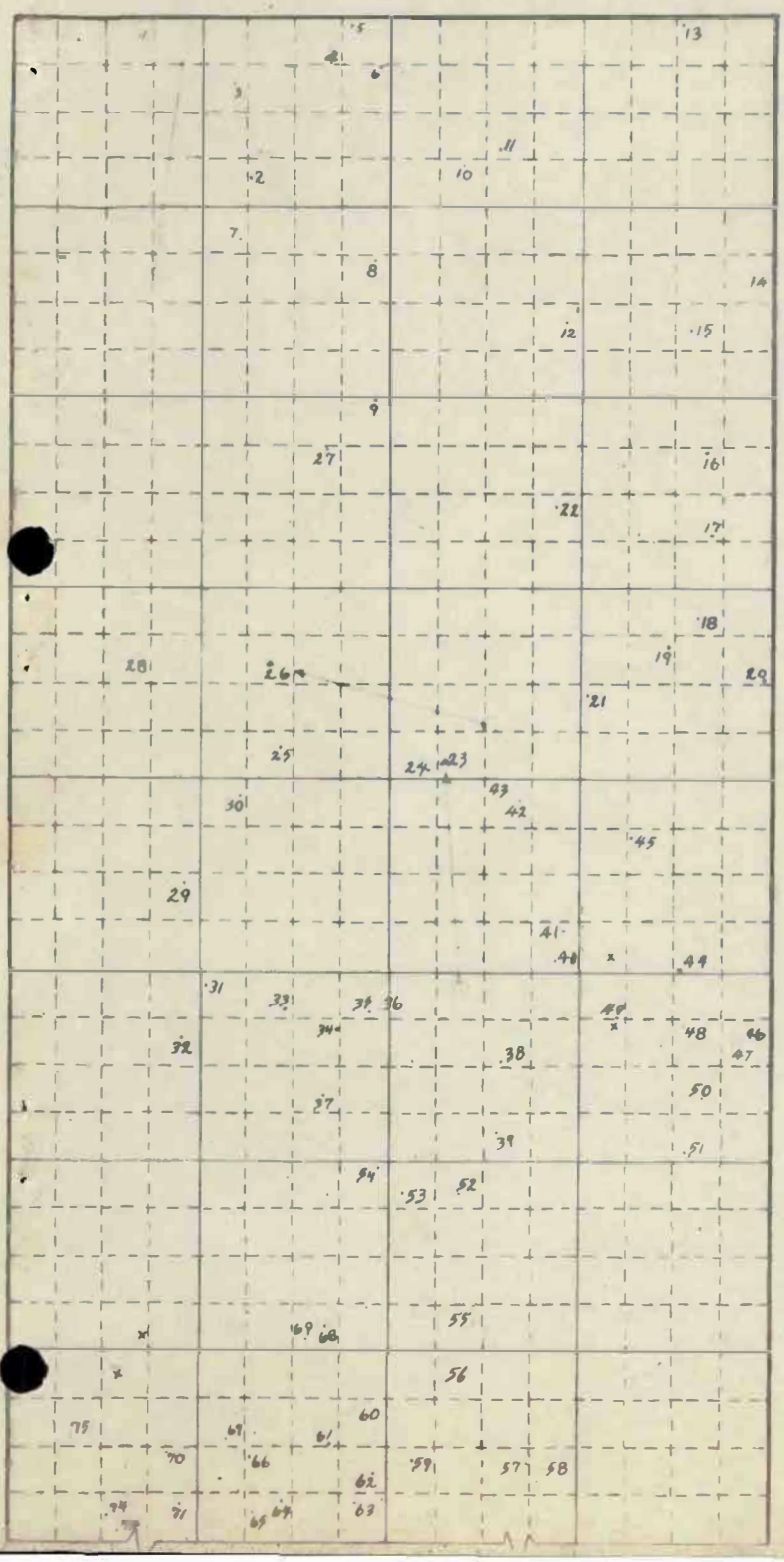
Scale 1" = 125 links

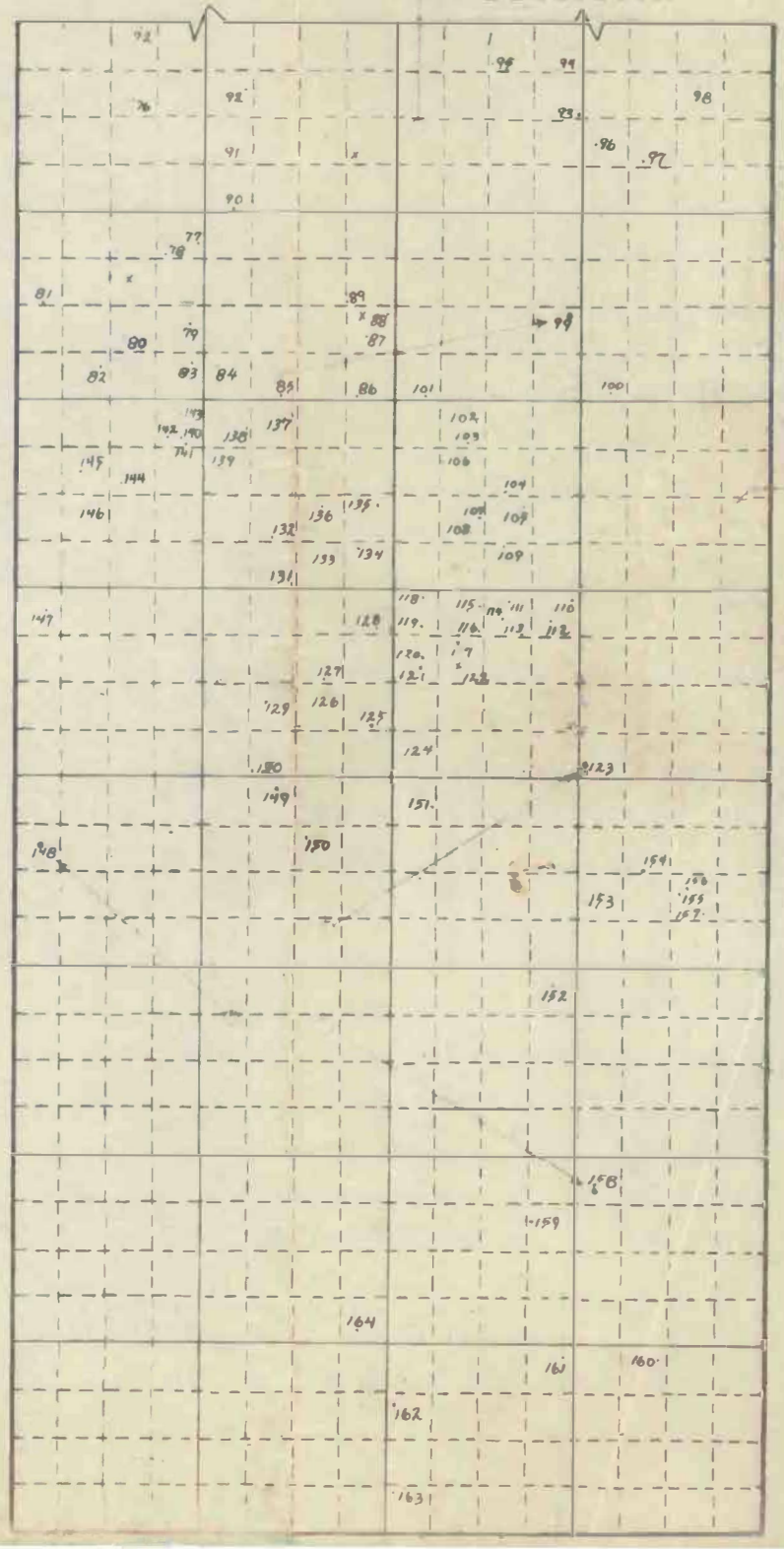
Legend

- Green Pine
- Pine Snag
- Photographic Station

Field Party

Date





TREE LOCATION MAP

RISK PLOT B.M.E.F.

COMPARTMENT B 29-10

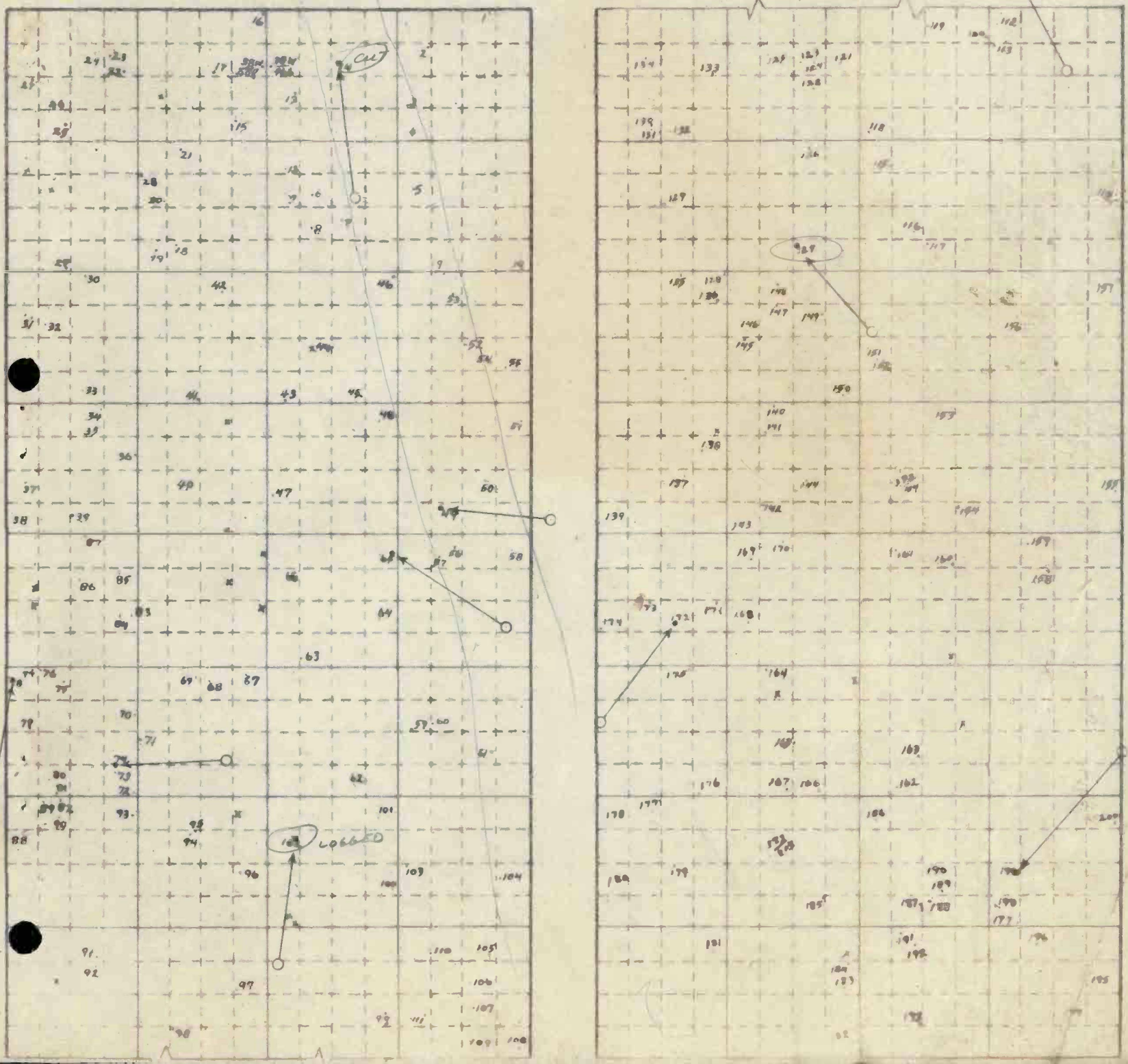
Scale 1" = 125 links

Legend

- Green pine
- Pine Snag
- Photographic Station

Field Party

Date



TREE LOCATION MAP

RISK PLOT B. M. E. F.

COMPARTMENT C 4 - 21

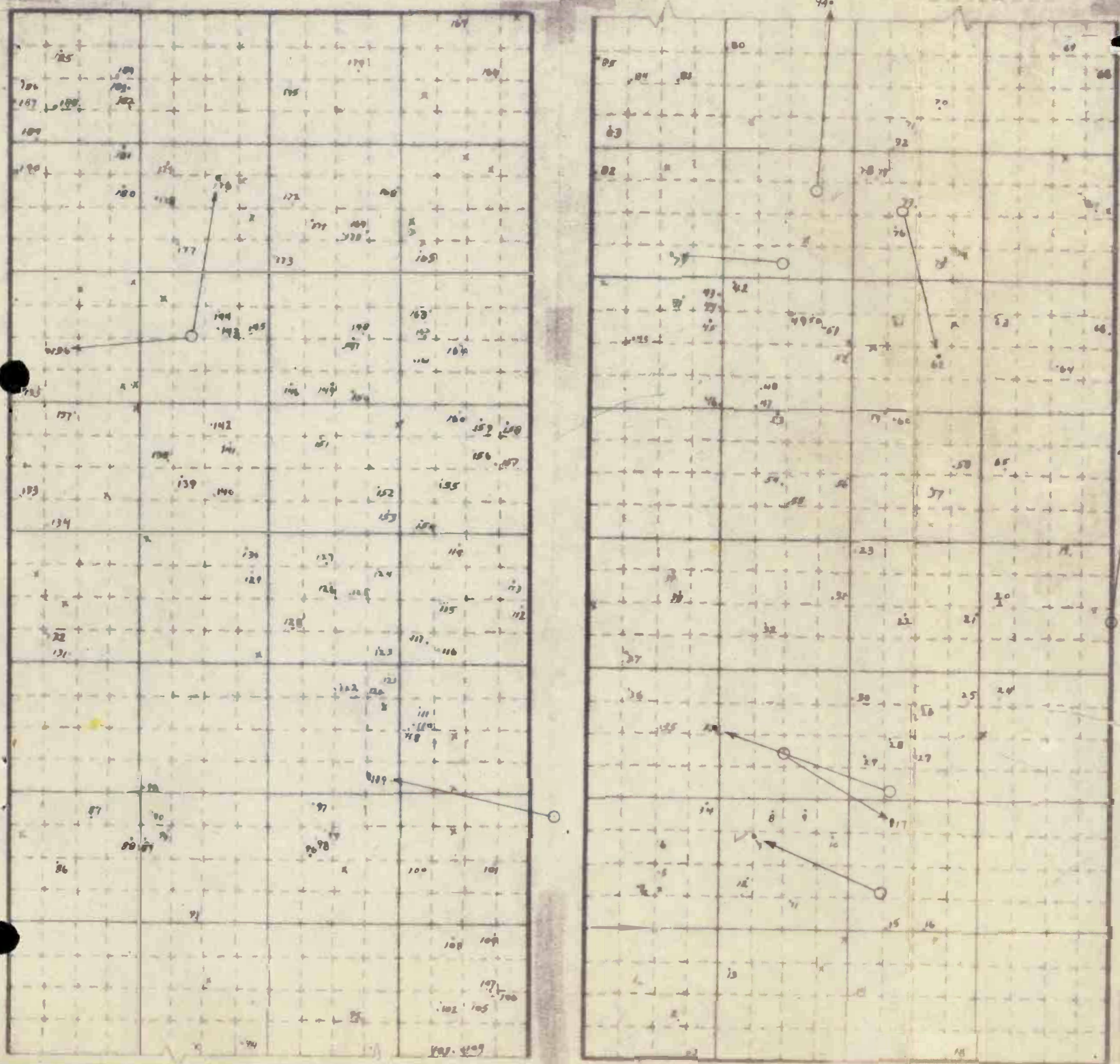
Legend

- Green Pine
- Pine Snag
- Photographic Station

Scale 1" = 125 links

Field Party

Date



TREE LOCATION MAP

RISK PLOT B.M.E.F.

COMPARTMENT G 2 - 12

Scale 1" = 125 links

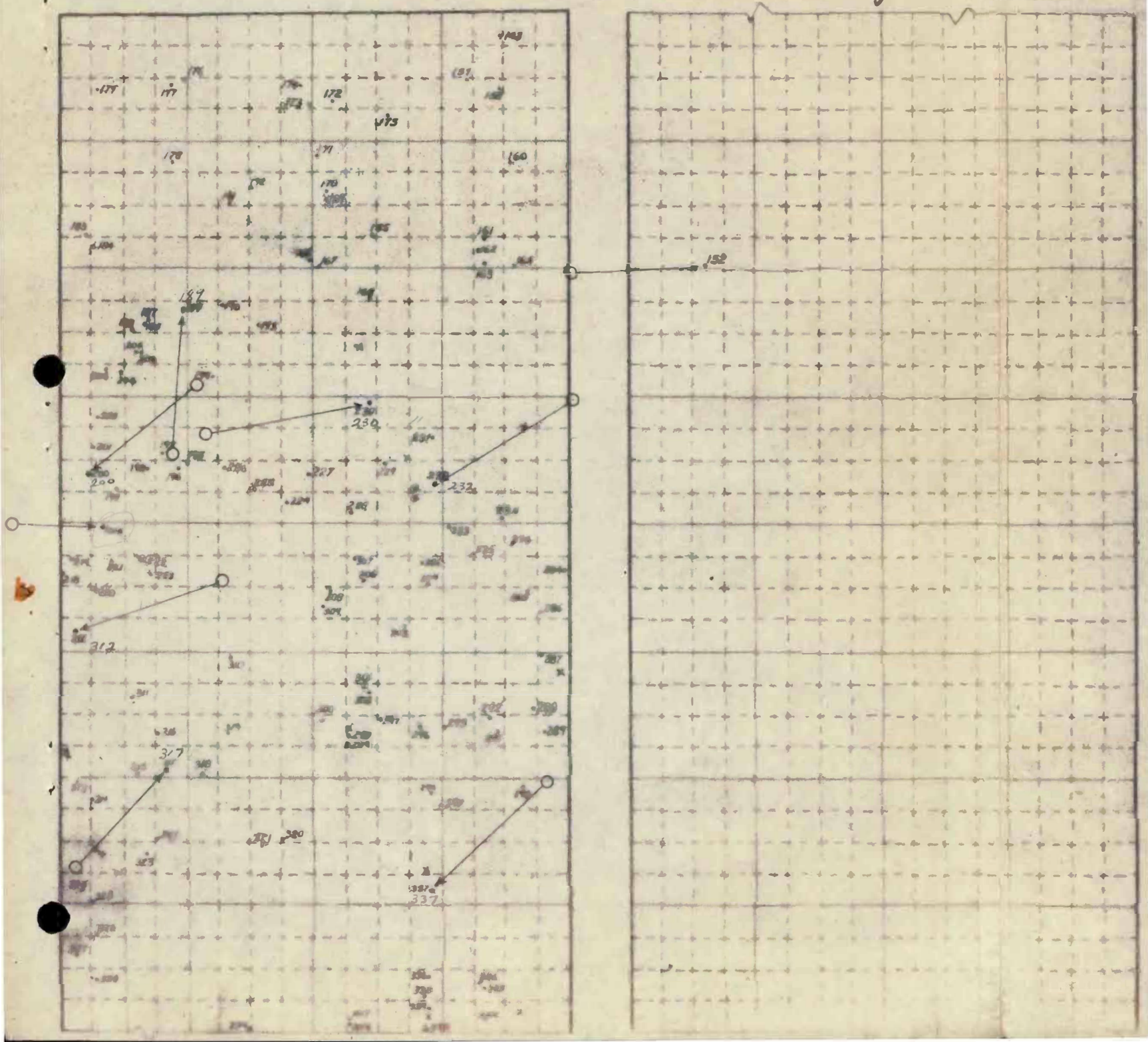
Legend

- Green Pine
- Pine Snag
- Photographic Station

N

Field Party

Date



TREE LOCATION MAP

RISK PLOT B. M. E. F.

COMPARTMENT P 21-28

Scale 1" = 125 links

Field Party

Legend

- Green pine
- Pine Snag
- Incense Cedar
- Photographic Station